

Feb. 28, 1928.

1,660,901

J. B. WILLSEA

PAPER CONDITIONING APPARATUS

Filed April 18, 1927

3 Sheets-Sheet 1

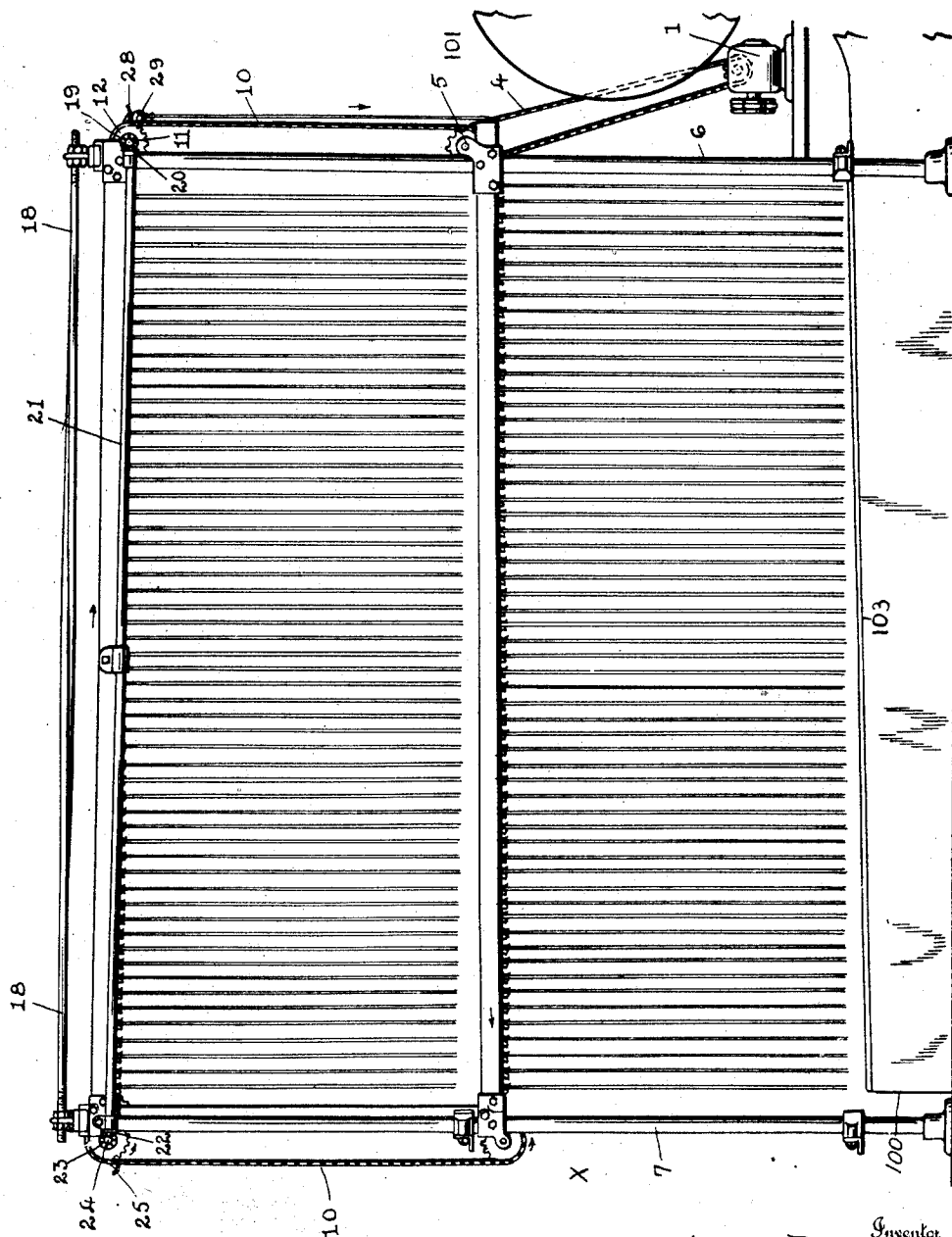


FIG. 1

Jasper B. Willsea ^{Inventor}

By

Frank Keiper

Attorney

Feb. 28, 1928.

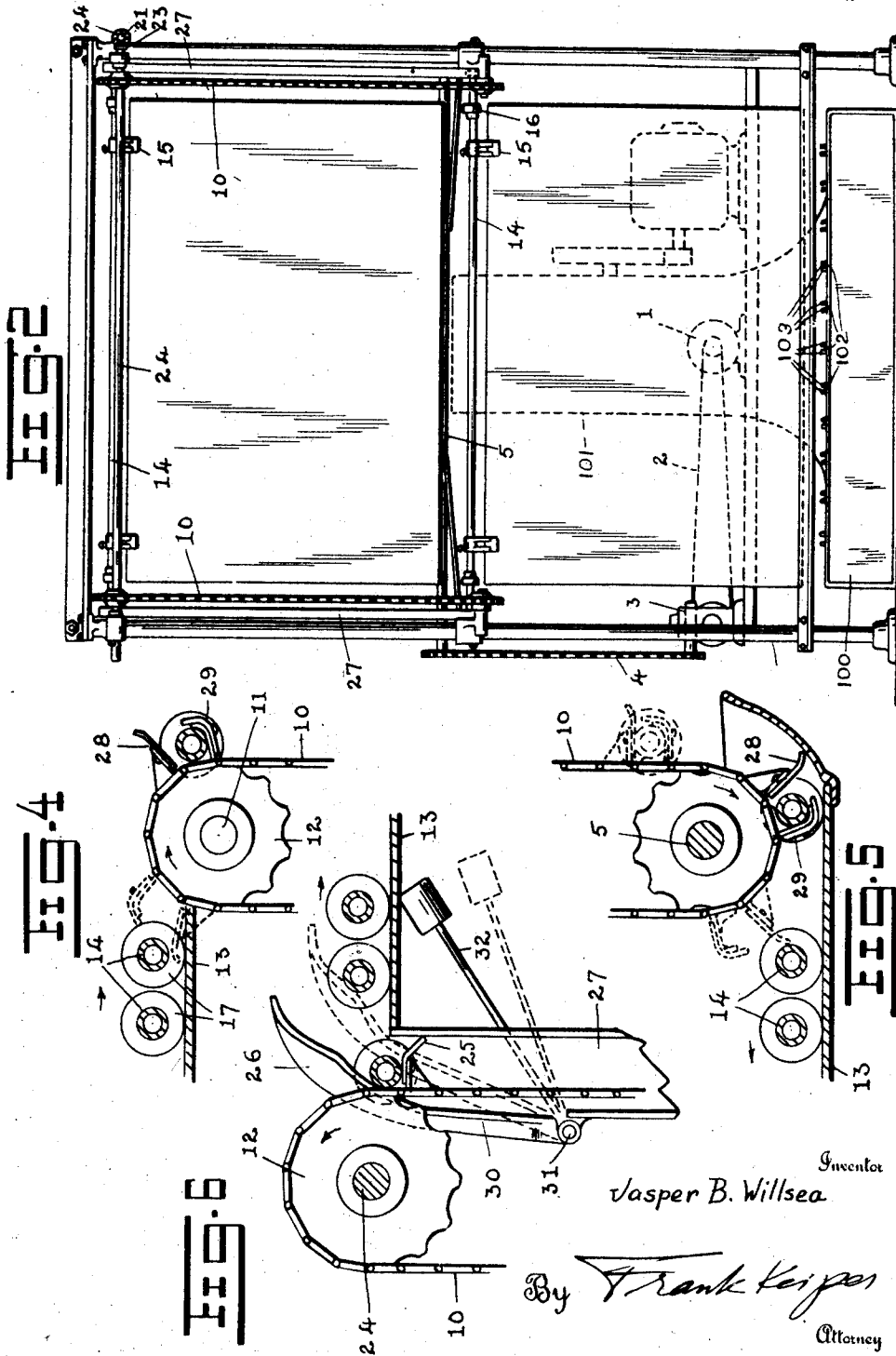
J. B. WILLSEA

1,660,901

PAPER CONDITIONING APPARATUS

Filed April 18, 1927

3 Sheets-Sheet 2



Feb. 28, 1928.

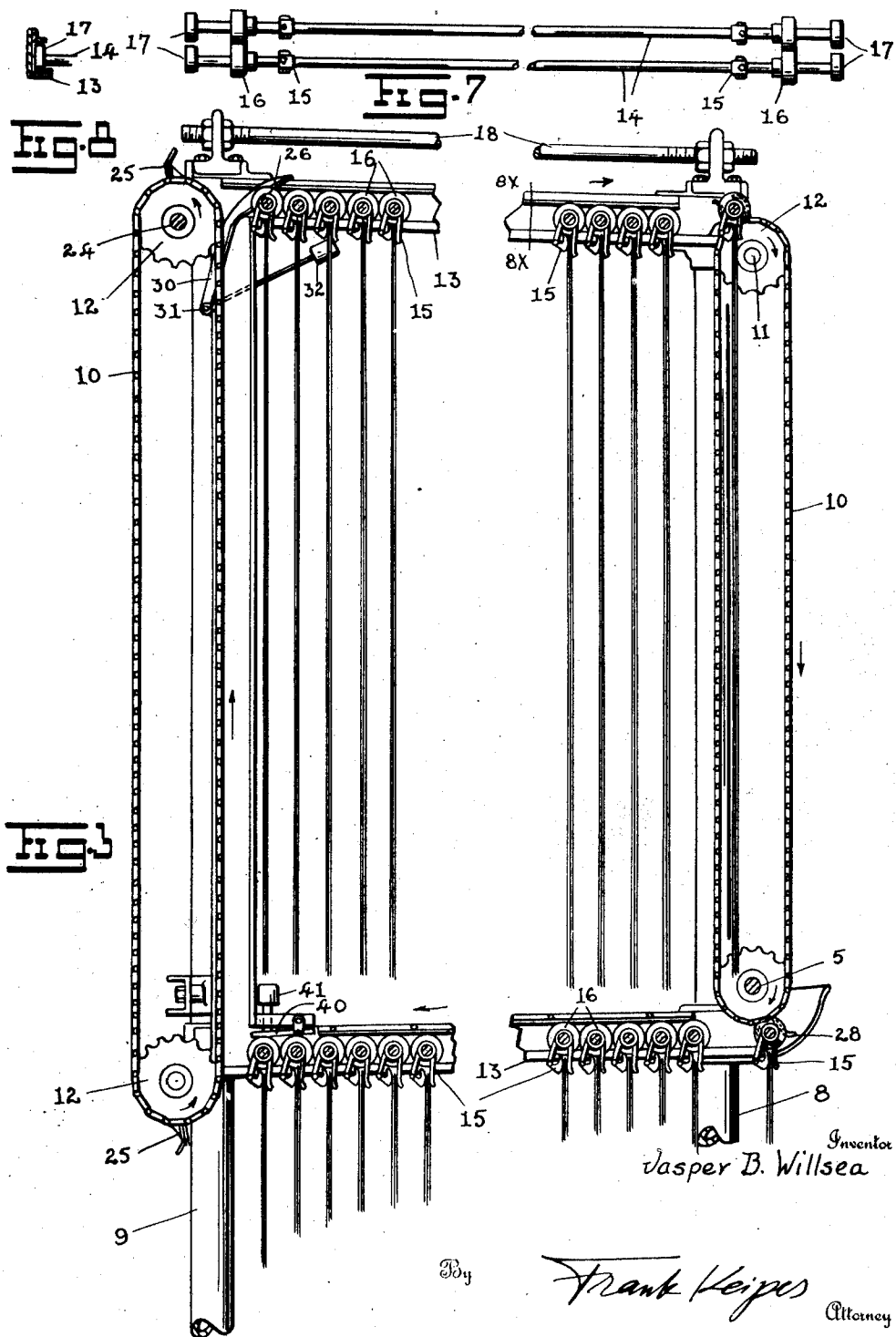
1,660,901

J. B. WILLSEA

PAPER CONDITIONING APPARATUS

Filed April 18, 1927

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE.

JASPER B. WILLSEA, OF ROCHESTER, NEW YORK.

PAPER-CONDITIONING APPARATUS.

Application filed April 18, 1927. Serial No. 184,477.

The object of this invention is to provide a new and improved form of machine for conditioning paper that is to be used for printing or lithographing. The object is more especially to bring the paper to the same moisture content as the air of the printing room to which it will be exposed during the printing operation so that it will neither give out moisture or take up moisture during the printing operation.

This and other features of the invention will be illustrated in the drawing, described in the specification, and pointed out in the claims at the end thereof.

In the drawings:

Figure 1 is a side elevation of the complete machine.

Figure 2 is an end elevation of the complete machine.

Figure 3 is an enlarged side elevation of the complete machine shown in Figure 1 with the intermediate part of the machine broken away so as to show the end portions of the machine on large scale.

Figure 4 is an enlarged detail view of the upper right hand corner of the machine shown in Figures 1 and 3.

Figure 5 is an enlarged detail view of the lower right hand corner of the machine shown in Figure 3.

Figure 6 is an enlarged detail view of the upper left hand corner of the machine shown in Figures 1 and 3.

Figure 7 is a top plan view of two of the cross bars placed side by side as they would be seen looking down on the machine.

Figure 8 is a vertical section on the line 8-8 in Fig. 3.

In the drawings like reference numerals indicate like parts.

In the printing operation, paper is usually fed from a large pile of paper into either the printing press or onto the lithographing stone. It is desirable to have the paper contain the same moisture content as the atmosphere of the room in which the printing is to be done so that the paper will not absorb or give up moisture during the printing operation. If it absorbs moisture or gives up moisture during the printing operation, the paper will not lie flat on the type or the stone or plate, but will curl and the length and breadth of the paper may change as well causing a distortion of the print or causing the consecutive colors to fail to reg-

ister with each other, which registry is necessary in a lithographic process.

The object of my invention is to provide a compact machine in which the sheets of paper will be sufficiently separated from each other and exposed to air either of the press room or air taken from the press room so that the paper will absorb or give up the necessary amount of moisture to bring it to the proper condition that will insure accurate printing. To secure this result and treat a large amount of paper in a comparatively short time, and in a comparatively small space in the shop, this machine has been invented.

In the drawings reference numeral 1 indicates the motor by which the machine is driven. 2 indicates the belt and 3 indicates the reducing gear and 4 indicates a chain driven thereby. 5 indicates a shaft supported on the frame of the machine by which the power is applied to the machine. The frame of the machine comprises upright posts 6, 7, 8 and 9 joined together at top and bottom and intermediately by a suitable frame work of angle iron and channels as best suits the purpose. The shaft 5 extends clear across the machine as shown in Figure 2 and has a sprocket thereon near each end thereof which drives the chains 10, 10 which in turn drive the short shafts 11 at the top of the machine on which are carried the sprocket wheels 12, 12 by which the chains are engaged. On each of the chains are carried two groups of jaws for a purpose that will presently be described. At the top of the machine and at the intermediate parts as shown in Figs. 1 and 2 are arranged two pairs of channel irons 13 such as is shown in vertical section in Figure 8. These channel irons 13 act as runways and extend the length of the machine. These channel irons 13, 13 support the carrier bars 14, 14 such as are shown in Figure 7 which carrier bars extend across the machine as shown in Fig. 2, the opposite ends of the carrier bars resting in the supporting channels 13. It will be understood that the channels at the top of the machine as shown in Figure 1 are filled with or have a complete complement of these supporting bars and the channels at the intermediate portions of the machine as shown in Figure 1 are filled with or have a complete complement of these supporting bars. The carrier

bars at the top of the machine move to the right as shown by the arrow at the top of the machine and the carrier bars in the intermediate part of the machine move to the left as shown by the arrow in the mid-portion of the machine. These carrier bars do not rotate. They are each provided with a pair of clips 15 by which a certain number of sheets of paper are hung or suspended from each of the carrier bars. Each carrier bar is also provided with a pair of collars 16, 16 which keep the bars spaced apart uniformly, the collars being of sufficient diameter to secure this result. The object is to give the sheets of paper suspended from the clips ample opportunity to spread out or separate from each other so as to permit the air to work in between and either absorb moisture from the paper, or give up moisture to the paper so that the paper may be brought to the correct moisture content during the time that it moves from the upper left hand corner of the machine shown in Figure 1 to the right hand end of the machine and then down to the lower part of the machine and then back to the lower left hand corner of the machine shown in Figure 1.

The ends of the carrier bars 14 are supported in roller bearings which are provided with collars 17, 17 between which and the ends of the bars a series of balls is interposed. The collars 17 are made slightly smaller than the collars 16 so as to avoid frictional contact with each other. Because of this and the roller bearings used, the bars 14 with the load of paper carried thereby are moved through the machine with the least mechanical effort.

The two end upright sections of the frame of the machine are tied together by the tie rods 18, 18 which extend diagonally between the far corners of the machine and cross each other at the middle of the machine.

As above described, power is supplied to the machine by the sprocket chain 4 and shaft 5 which in turn drives the sprocket chains 10, 10 and the shaft 11 at the top of the machine. On the end of the shaft 11 is a bevel gear 19 which meshes with a similar beveled gear 20 on the end of a shaft 21 which runs the length of the machine as shown at the top of Figure 1. On the left hand end of this shaft is a similar beveled gear 22 which meshes with the beveled gear 23 carried on the shaft 24 shown at the upper left hand corner of Figures 1 and 3. This shaft 24 carries sprocket wheels 12 which drive upright chains 10, 10 which sprocket chains in turn drives the sprocket wheels 12 at the bottom of the machine as shown at the left of Figure 3.

It will also be seen that the chains 10, 10 at the left of the Figure 3 carry the lifting

fingers 25 and the chains 10, 10 at the right of Figure 3 carry the jaws 28 and 29 one member of which is on one link and the other member is on the next link and the jaws open as they pass around the sprocket and close when they get beyond the sprocket. It will be understood that the pair of sprocket wheels at the lower left hand corner of the machine and at the upper right hand corner of the machine as shown in Figure 3 are carried on short shafts or studs and not by a single long shaft for the reason that a single long shaft at those corners of the machine would obstruct the movement of the paper and the short shafts or studs leave an open space between them through which the paper can move. The sprocket wheels at the upper left hand corner of the machine and the lower right hand corner of the machine as shown in Figures 1 and 3 are carried on long shafts for in those places the long shafts would not interfere with the movement of the paper.

It will also be seen from an inspection of Figure 3 that the chain on the left hand side of the figure is longer than the chain on the right hand side of the figure. The chain on the right hand side of the figure is provided with two pairs of jaws one of which pairs will receive a bar at the top of the machine for each bar that the other pair discharges at the bottom. The chain on the left hand side of the figure is provided with two sets of figures one of which will receive a bar at the bottom for each bar that the other set discharges at the top. The fingers on the one chain must synchronize with or keep in step with the jaws on the other chain, so that as a bar is pushed in at one end of the channels, a bar can be taken away from the other end of the channels and it is also necessary to have the chain at the left hand end of the machine as shown in Figures 1 and 3 longer than the chain shown at the right hand end of the machine. To make this possible and keep the chains in step, the chains themselves are provided with links which are of the same length or the same distance between the centers in the several chains but the sprocket wheels on the left hand side of the machine have one or more teeth in them than the sprocket wheels on the right hand end of the machine, so that with the same angular velocity of the sprocket wheels on both ends of the machine, the sprocket chains on the left hand end of the machine will travel faster than the sprocket chains on the right hand end of the machine, each set of chains making a half revolution in exactly the same time. In this way the chains and the carrying devices thereon are kept in step, and the machine operates to transfer the bars without interference.

It will also be understood that the hori-

zontal channels at the top of the machine are not parallel with the horizontal channels at the intermediate part of the machine. The top channels slope down to the right, and the lower channels slope down to the left causing the bars to move that much easier because they move to that extent by gravity. This also causes the chains 10 at the left of the machine to be somewhat longer than the chains 10 at the right of the machine.

The operation of the machine is as follows:

The sheets of paper are fed into the machine at the lower left hand corner of Figure 1. Ordinarily about 50 sheets of 3 point paper are clamped in each pair of clamps 15 on a bar 14 shown at the bottom of Figure 3, and the paper hangs suspended from these clamps being fastened only at the top. If thicker paper is used a smaller number of sheets will be hung or suspended from each pair of clamps. If thinner paper is used the number of sheets will be correspondingly increased it having been found by experience that .15" in the thickness of the paper is about the proper net thickness of the paper to be supported by each pair of clamps. The clamps or bars are spaced between centers by the collars 16 by about 2". This permits the sheets of paper to open up and let the air work in between them. As above stated the paper is fed into the machines at the lower left hand corner of Figures 1 and 3. The chains 10 move up on the inside and carry the fingers 25, which engage under the bar 14 between the roller bearings 17 and the collar 16 and carries the bar up to the upper pair of channels at which point it is pushed off by the cam 26, which is carried on the upright arm 30 which swings on the stud 31. The weighted arm 32 is attached thereto and forms a bell crank lever therewith. When the bar 14 is pushed up, the cam 26 yields until the bar is opposite the channels and then the cam 26 swings forward and pushes the bar into the channels. The finger 25 is bent down at an angle of 45 degrees on the ends, that is just beyond where it contacts with the bar 14. This permits the bar to move off the finger easily due to the pressure of the cam 26. During their upward travel, the bars 14 are guided and held in place on the fingers by the upright channels 27 which engage the collars of the roller bearings on the ends of the bars. When the bars are discharged into the horizontal channels at the top of the machine, each bar pushes the bars ahead of it. As the channels are full of bars, when a bar is pushed in at the left hand upper corner of the machine as shown in Figure 1, a similar bar is pushed out of the channels at the upper right hand corner of the machine as shown in Figures 1 and 3, and at that

moment the jaws 28 and 29 carried on the chains 10 are spread apart to receive the bar and carry it around the sprocket wheels 12 as shown in Fig. 4 after which it is carried down to the position shown in Fig. 5 where it is finally discharged into the lower pair of channels.

The lower pair of channels are full of the bars 14 just as are the upper pair of channels so that when a bar 14 is pushed into the lower pair of channels at the right, a similar bar is pushed out of the channels at the left hand end onto the chains 10 to be carried up as above described. The conditioned paper is removed from the clamps at the point marked *x* in Figure 1 and another supply of paper is placed in the clamps at this point, it being understood that the paper is not removed from the machine until it has passed completely around the machine which passage of the paper takes about two hours or more in all.

At the discharge end of the lower channels a brake shoe 40 is provided which has a groove or recess therein that engages with the collar 17 and holds the end roller in place at that place in the end of the channel and prevents the bar from moving into lifting position until another bar is pushed into the channel at the other end. The brake shoe is helped by the weight 41 which presses on it for this purpose.

The air with which the sheets of paper are conditioned is blown against the paper from the air duct 100 by means of a cap 101. A series of longitudinal slots 102 are provided in the top of this duct with a flange 103 on each side thereof so as to direct the air against the sheets of paper suspended above the duct.

I claim:

1. In a paper conditioning apparatus, the combination of a series of paper supporting bars, a supporting collar mounted at each end of each of said supporting bars and allow the supporting bars to freely rotate between them, two pair of guide channels superimposed to each other and adapted to receive said supporting collars and allow them to roll therein from one end to the other end thereof with said suspension rods held freely suspended between them, means provided at one end of said pair of channels to elevate the supporting bars with their supporting collars from the lower pair of guide channels to the upper pair of guide channels and means provided at the other end of said pair of guide channels to lower the supporting bars with their supporting collars from the upper pair of guide channels to the lower pair of guide channels.

2. In a paper conditioning apparatus, the combination of a series of paper suspending bars, a roller at each end of each of said suspending bars and mounted to freely ro-

tate thereon, two pair of guide channels adapted to support said rollers with the suspending bars located between said guide channels and allow said suspending bars to
 5 move from one end, of each pair of guide channels to the other end thereof with said suspension bars held in a predetermined position between them, one of said pair of guide channels being located above the other
 10 of said guide channels and means for elevating said suspending bars with their rollers from the lower pair of guide channels to the upper pair of guide channels and means for lowering said suspending bars and their
 15 rollers from the upper pair of guide channels to the lower pair of guide channels at the opposite end of said guide channels.

3. In a paper conditioning apparatus, the combination of a series of paper suspending bars, anti-friction rollers supporting the ends of each of said suspending bars, a spacing collar on each of said suspending bars adapted to prevent the frictional
 20 contact between consecutive anti-friction rollers, a pair of guide channels supporting said anti-friction rollers, means for placing a suspension bar with its anti-friction rollers into said guide channels at the front
 25 end thereof and means for picking up the suspension rod with its anti-friction roller at the rear end of said guide chamber displaced by the insertion of a suspension rod at the front end of the guide channels.

4. In a paper conditioning apparatus, the combination of two pair of parallel channels located above each other, the upper pair of channels being inclined in one direction and the lower pair of channels being inclined in the opposite direction, suspension
 35 rods located between each pair of channels, anti-friction rollers at the outer ends of said suspension rods, said anti-friction rollers adapted to roll in said channels and supporting the ends of said suspension rods
 40 in said channels, means for spacing said rollers from one another in said channels to provide a free rolling movement of said anti-friction rollers in said pair of channels, a friction member at the end of one of said
 50 channels engaging said suspension rod retarding the movement of said anti-friction rollers in the direction of the incline of said channels, and means for withdrawing a suspension rod from one of each of said pair
 55 of channels and transferring it to the other of said channels.

5. In a paper conditioning apparatus, the combination of two series of suspension rods supported one above the other series, means
 60 at one end of said two series of suspension rods for transferring one of said suspension rods from the lower series of suspension rods to the upper series of suspension rods and means at the other end of said series of sus-
 65 pension rods for transferring one of the

suspension rods of the upper series to the lower series of suspension rods, supporting rollers at each end of said suspension rods and spacing means between consecutive supporting rollers to provide a free rolling
 70 movement of said supporting rollers with said suspension rods supported between them.

6. In a paper conditioning apparatus having paper suspension rods for suspending
 75 paper sheets and supported in two superimposed series, the combination of a transfer mechanism comprising an endless chain, a finger carried on one of said endless chains adapted to pick up one of said suspension
 80 rods and raise it to a higher level, a downwardly inclined extension on said finger and a deflecting finger cooperating with said downwardly projecting extension of said finger on said endless chain to brush off and
 85 move away the suspension rod elevated by said endless chain.

7. In a paper conditioning apparatus having paper suspension rods for suspending
 90 paper sheets and means for supporting said paper suspending rods in two superimposed series, the combination of an endless chain comprising a series of links at one end of said series of suspension rods, an outwardly
 95 projecting and upwardly curved jaw carried on one of the links of said endless chain, a second jaw carried on the succeeding link of said endless chain, said jaws being adapted to have their outer ends separate from
 100 each other at each end of said endless chain to receive or deposit a suspension rod, said jaws also being adapted to have their outer ends brought together during their travel from one end of said endless chain to the
 105 other to lock the suspension rod in place between them.

8. In a paper conditioning apparatus, the combination of two series of suspension rods supported one above the other series, means
 110 at one end of said two series of suspension rods for transferring one of said suspension rods from the lower series of suspension rods to the upper series of suspension rods and means at the other end of said series of
 115 suspension rods for transferring one of the suspension rods of the upper series to the lower series of suspension rods, a gripping member carried by each of said suspension rod adapted to hold a sheet of paper sus-
 120 pending from said suspension rods, an air duct located below the series of suspension rods having a series of parallel longitudinal slots in the top thereof, flanges on each side of the slots in said duct, and means for
 125 forcing air from said slots in said air duct past the sheets suspended from the lower series of suspension rods and the paper sheets suspended therefrom onto the sheets of paper suspended from the upper series
 130 of suspension rods.

9. In a paper conditioning apparatus, the combination of a pair of inclined runways mounted above each other and inclined in opposite direction to each other, a series
5 of suspension rods placed side by side in each of said runways, spacing members carried by said suspension rods, rolling members supporting said suspension rods in said runways, an endless chain mounted to rotate at each end of said pair of inclined
10 runways, and means carried by one of said endless chains to pick up a suspension rod at the end of the lower runway and raise it to the end of the upper runway to displace a suspension rod out of the upper runway in engagement with the other of said
15 endless chains and lower this suspending rod so displaced from the upper to the lower runway to displace a suspension rod in the lower runway.

In testimony whereof I affix my signature.
JASPER B. WILLSEA.